Basic Arithmetic Operations
Understanding the basic arithmetic operations namely Addition, Subtraction, Multiplication and Division.

About - Operation

Insight

- Components
    - **Operation**: 2 + 3
    - **Operator**: + (plus)
    - **Operands**: 2 and 3
- Properties
    - **Commutative**: **a** $ **b** = **b** $ **a**
    - **Associative**: (**a** $ **b**) $ **c** = **a** $ (**b** $ **c**)

About - Addition

Insight

- Plus
- Sum
- Summation
- **Totalling**
- **Counting**
- Properties
    - Commutative: **a** + **b** = **b** + **a**
    - Associative: (**a** + **b**) + **c** = **a** + (**b** + **c**)

About - Subtraction

Insight

- Minus
- **Difference**

Properties

- Not Commutative: **a** - **b** ≠ **b** - **a**
- Not Associative: (**a** - **b**) - **c** ≠ **a** - (**b** - **c**)

About - Multiplication

Insight

- Product
- Shortcut of **repeated addition**
- **a** X **b** = **a times b**'s = **b** + **b** + **b** + ... **a** times
- Properties
  - Commutative: **a** X **b** = **b** X **a**
  - Associative: (**a** X **b**) X **c** = **a** X (**b** X **c**)

Exercises

Exercise:

Problem: Why is **a** X **b** always equal to **b** X **a**?

Solution:

Visualization: Draw a grid with **a** rows and **b** columns and rotate the page 90 degress so that the rows appear as columns and columns appear as rows. Now we have **b** rows and **a** columns.

a X **b** = **a** times **b**'s = **b** times **a**'s = **b** X **a**.

Exercise:

Problem: If **a** X **b** = **c** then why is **c** ÷ **a** = **b** and **c** ÷ **b** = **a**?

Solution:

Note: **a** times **b**'s = **b** times **a**'s = **c**.

Visualization: Draw a grid with **a** rows and **b** columns, or; **b** rows and **a** columns.

If we repeatedly take away **b**'s then that can be done **a** times. Therefore **c** ÷ **b** = **a**.

If we repeatedly take away **a**'s then that can be done **b** times. Therefore **c** ÷ **a** = **b**.

About - Division

Insight

- **Sharing or Distributing equally**
- Shortcut of **repeated subtraction**
- **a** ÷ **b** denotes **b** is repeatedly subtracted from **a** for maximum number of times.
- Components
    - **Quotient**: How much each one will get? How many times a number can be repeatedly subtracted?
    - **Remainder**: How much will remain that can not be distributed?

Properties

- Not Commutative: **a** ÷ **b** ≠ **b** ÷ **a**
- Not Associative: (**a** ÷ **b**) ÷ **c** ≠ **a** ÷ (**b** ÷ **c**)

Exercises

Exercise:

Problem:

If **t** chocolates are distributed among **n** students, how many choclates each student will get?

Solution:

Visualization: Distributing equally.

Visualization: Repeatedly subtracting n chocolates from t chocolates so that each student gets one.

t ÷ **n**.

Exercise:

Problem:

If each student should get **n** chocolates. How many students will get chocolates if there are **t** chocolates?

Solution:

Visualization: Repeatedly subtracting **n** chocolates from **t** chocolates because each student should get **n** chocolates.

t ÷ **n**.

Multiples and Factors